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after Kaup. Fig. 9, *Mastodon latidens*. Fig. 10, *Emmenodon elephantoides*. Fig. 11, *Elephas bombifrons*. Fig. 12, *Elephas ganesa*. Fig. 13, *Elephas insignis*. Fig. 14, *Emmenodon planifrons*. Fig. 15, *Elephas africanus*. Fig. 16, *Elephas meridionalis*. Fig. 17, *Elephas hysudricus*. Fig. 18, *Elephas namadicus*. Fig. 19, *Elephas indicus*. Fig. 20, *Elephas primigenius*.

ACROSS THE SANTA BARBARA CHANNEL.

BY J. WALTER FEWKES.

THE island of Santa Cruz, from the Mission Church of Santa Barbara, looks not unlike Capri, from the City of Naples. The same blue sky arches over it, the same Mediterranean haze envelops it, its outlines are softened by its distance, and its cliffs rise equally precipitantly from the sea. In my tarry at Santa Barbara, in the spring of 1887, I had repeatedly turned my eyes seaward, across the channel, longing for the opportunity, which at last came, to cross the intervening waters, and set foot on this island. My trip across the channel was productive of both pleasure and profit, and may not be without interest to my readers.

Although a comparatively narrow channel separates the Santa Barbara islands from the mainland, the means of communication are not always at hand. The enterprising fisherman, Larco, often crosses it in his Italian sailboat, the "Genova," but his accommodations for passengers are more or less limited. The vessel owned by the proprietors of the island was not at my disposal, and the only thing left was to charter a craft for my own use. Fortunately, it was possible to find such a vessel, and I was able to visit the nearest of the Santa Barbara islands, long ago discovered by Cabrillo, upon which, according to some authorities, he was buried.¹

¹ Other historians say this intrepid discoverer found his grave at a neighboring island of San Miguel. Certain it is that he was the first European to sail up the Santa Barbara Channel, and that he lost his life on this voyage. His grave, wherever it may be, is not yet marked by monument or commemorative stone.

The "Angel Dolly," which is at anchor off the wharf at Santa Barbara, was found to be admirably suited for my trip, and after a few preparations, I embarked on her, and hoisting her sails, we turned her southward to the rocky cliffs of the island of the Holy Cross. The "Angel Dolly" is a small schooner of about twenty tons burden, with a cabin, which the passengers share with the captain, a forecastle for the crew, and a capacious hold. The crew consisted of a captain, one man before the mast, and a cook. The cabin I found well suited for my scientific work, and I transformed it into a laboratory, the mess table serving well for microscopic work when the vessel was on an even keel. My dredge, ropes, and nets were well stored in the hold, and at noon, in the middle of March, we hove anchor, set her sail, and went to sea. It had been my intention to visit the island of San Miguel, but the wind was so light that we shaped our course directly to Santa Cruz.

The weather, when we left Santa Barbara, was foggy, and after getting outside the zone of giant kelp,¹ we were becalmed. As a result we drifted back and forth all the afternoon, and finally found ourselves down the coast towards Carpinteria, the storehouse and wharf of which place we saw a few miles away, at nightfall. Although the distance across the channel is about twenty-eight miles, we made little progress that night, and drifted about in the fog until Sunday morning. After many calms, puffs of air, and baffling winds, we sighted, Sunday morning at ten o'clock, the lofty peak of Punta del Diablo, the most lofty headland on the island of Santa Cruz. We ran in toward the land, through the fog, to the neighborhood of the shore, and anchored in a small fiord at the base of Monte Diablo. This fiord, which we will call Star Cañon, is enclosed by lofty cliffs many hundred feet high. As we sailed into it, I saw, for the first time on the Pacific ocean, a large *Salpa*, which rivals the *Salpa maxima* of the Mediterranean, a floating Ascidian, the "solitary

¹ This zone forms a curious belt, skirting the shore at Santa Barbara. It is composed of the floating fronds of a giant alga (*Nereocystes*), and is situated about three hundred yards from the shore. This zone imparts a highly characteristic appearance to the coast of many parts of Southern California.

form" of which is as large as a man's hand, and the "chain form" is many yards in length.

Looking into the cañon¹ from our anchorage, we notice that the high cliffs of the brow, which appears an unbroken peak from Santa Barbara, have a cleft form with jagged edges, as if they had been broken asunder by volcanic forces. This effect is thought to be due to the recent elevation of the island, and to tell the same story as the raised terraces on the eastern and western ends of the island. In the chart, by the Coast Survey, a mountain called Ragged Mountain occupies the position of this break. The mode of formation of this cañon and fiord² is not wholly clear to me. That water has played an important part in its formation is doubtless true, but, at the same time, the sharp break indicates some other and more violent geologic agency. The perpendicular walls of the cañon are certainly from 600 to 900 feet high. The cañon makes up through the mountains, and in the present season a good stream of fresh water flows out of it past the shingly beach to the cove. On the mountain side we noticed little vegetation, but here and there a clump of prickly pears, and small bushes with yellow poppy flowers. The rock is a coarse conglomerate, the embedded boulders of black asphaltic color, and the matrix red. The matrix is in many places very much eroded, and the hard, embedded, angular rocks stand out in relief, sometimes clinging to the cliff by a single edge. The embedded rocks are angular, and little water-worn, except where they are exposed to wave action.

¹ This fiord is almost directly opposite Santa Barbara, under the high peak, which appears from this city to be the apex, or highest point of the island. Its name is not given on the excellent chart of the island, which I made use of on my trip.

² From my work with the dredge I am led to believe that these chasms in the islands which are called cañons extend for some distance under the water. I have found records that the officers of the Coast Survey have made similar observations. If such a submarine continuation of these cañons occur, it is difficult to explain them as wholly the result of erosion, or if of aerial erosion, the islands may have sunk subsequent to this action. The evidence on the west end of the island points to elevation, or in this way the elevated terraces were interpreted.

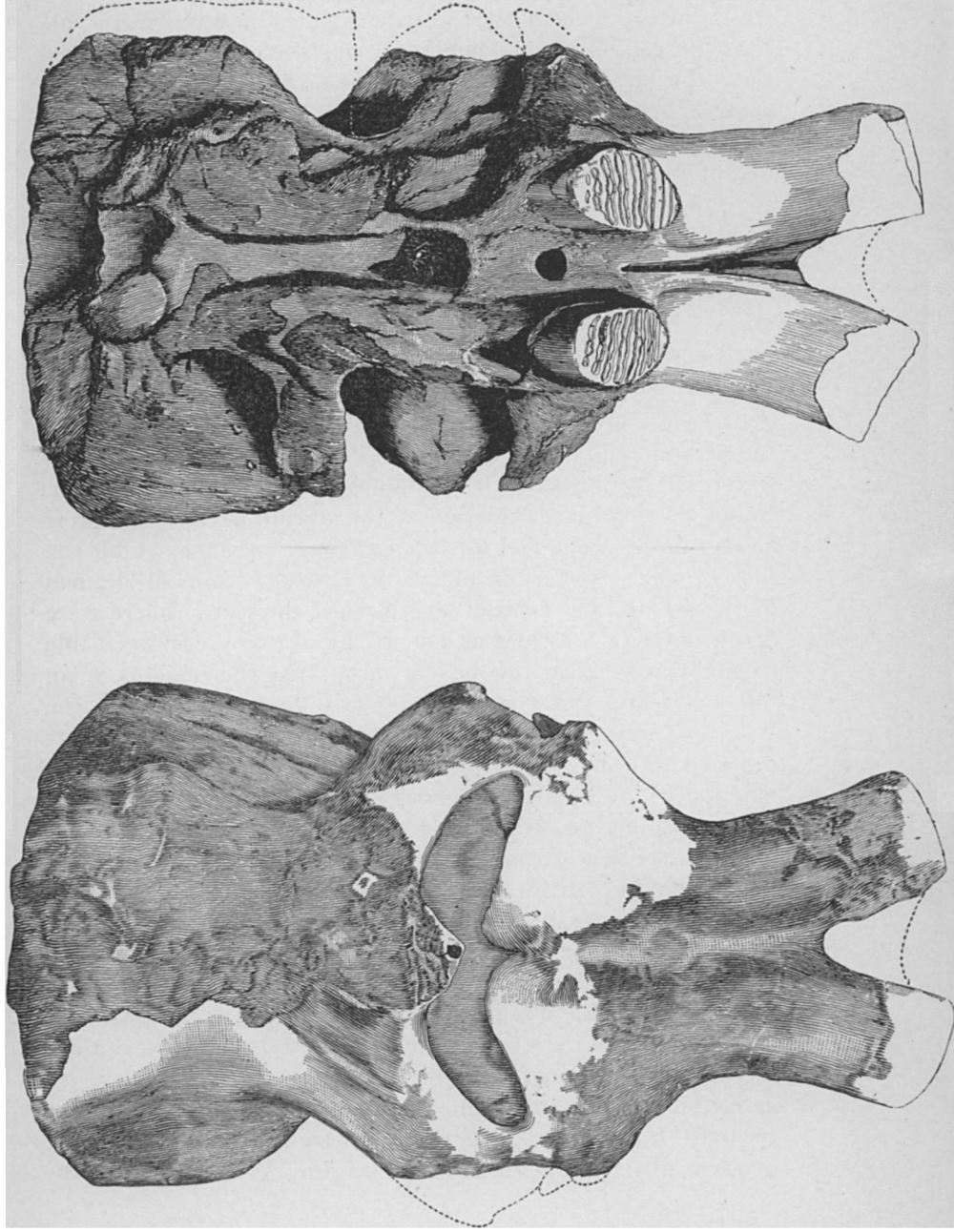
Some of the neighboring islands like Anacapa, show similar elevation, with enormous denudation. The form of this island from the sea is highly suggestive, but I was unable to land upon it.

The fiord in which the "Angel Dolly" rides at anchor is well protected from the prevalent gales, and the water, although deep, is easily sounded by our anchor. We anchored near the shore, not far from the beach, at the end of the cañon. After all had been made snug aboard, we rowed to the shore, and took a stroll up the cañon, following the bed of the brook. The cañon is well wooded with many kinds of trees, and with ferns and mosses, with here and there, wild flowers. As we landed on the shore we started up two small, wild foxes, *Urocyon littoralis*, so abundant on the island, and came within easy gunshot of them.

On each side of the cañon the cliffs rise precipitantly, almost perpendicularly, so that it is impossible to climb them, and it is with great difficulty that we made our way along their base. Many large boulders lie strewn along the bed of the stream, and there are many deep basins of pure, fresh water, fed by the sparkling mountain stream from the cañon. In one or two places the bed of the stream is dry, the water having made a channel for itself through passages under the rock or soil. At certain places these dry sections of the bed of the stream are coated with a white deposit. There were many cottonwood trees as far up the cañon as we were able to penetrate. Near the beach we noticed the remains of an old camp-fire, and the skins of two sheep, which told the story of a former camping party, probably of fishermen, visitors to this lonely and picturesque place. There are also many abalone shells (*Haliotis*), the animals of which had also, no doubt, formed part of the meal of these visitors.

The level deposit of soil at the mouth of the cañon must have been a favorite camping place for the Indians who once lived in great numbers on this and neighboring islands, for on the side hill there is a high shell heap where they had thrown the debris of their camp. This shell heap was formed in great part of the shells of a large *Balanus*, *Haliotis*, and Mussels. On the sides of the rocks above it many Indian inscriptions were cut in the hard rocks of the conglomerate. These inscriptions were made with some care and consist of parallel grooves in the rock across which, at right angles, were other grooves all of undoubted Indian origin. We returned to the

PLATE XIV.



Elephas primigenius columbi Falc.

“Angel Dolly” and transported our cooking utensils on shore preparatory to a camp there under the brow of the cliffs of the cañon.

In the afternoon I took a sailor and one of the seal boats of the schooner and rowed down the shore to the westward under Punta del Diablo to the “Seal Rookery.” This boat ride was the most wonderful trip which I have ever taken on the coast of California. The cliffs to the west of Star Cañon rise perpendicularly to the height of many hundred feet, so that it is impossible to climb them except in the small fiords or cañons which extend into the mountains. Immediately after rounding the high headland to the west of Star Cañon we come to the first cañon, which is well wooded and surrounded by mountains which are grandly picturesque. We did not land in this fiord but continued to the second, which was even more rugged and abrupt than the first. This cañon presented to us a landing place, and we rowed through the heavy surf, landing on a small beach. The cañon is well wooded but closed a short distance from the beach by a high boulder, which has fallen into it, so that the cañon is almost blocked up. The boulders, which stop up several of the cañons, are thought to have been eroded from the cliff in the position they at present occupy, and not to have been transported from higher up the cañon by water or ice.¹

We made our way back of the boulder through a crevice between it and the cliff and continued up the cañon a few hundred yards, but the way gets more difficult, the loose

¹Something analogous to this is to be seen in the boulders of red sandstone which are strewn along on the mesa at the foot of the Santa Inez mountains back of Santa Barbara. These rocks are sometimes of great size and, according to Whitney, were washed down from the mountains which everywhere show signs of great erosion. They become very thickly massed together in some places and often reach enormous proportions. I was unable to find glacial striæ on the sides of the Santa Yeuiry range although I repeatedly looked for them.

One of the most famous of these large erratic rocks is that near Montecito which bears the Indian inscription done in red paint. Beyond the Mission Church they are very numerous in some places blocking up the cañons as in the island of Santa Cruz. In some places they are so numerous that they almost form boulder rivers. Just back of the Spanish part of Santa Barbara between the city and the mesa there are many eroded valleys and as we pass over the mesa to the foot of the Santa Yeuiry range the erratic rocks increase in size and number.

rocks more numerous and the walls of the cañon more and more precipitant. The same conglomerate is present here as at Star Cañon, near which our schooner is anchored.

I made a sketch of the place and took again to boat passing under the brow of Punta del Diablo, one of the grandest points of the island.

Under the base of Diablo opens "Devil's Cañon" or "Devil's Cove," a most picturesque, wild and rugged combination of land and sea. In this part of Santa Cruz there are no beaches and no zone of kelp, but the water sinks to a great depth hard by the shore, and dredging was impossible with the implements at my disposal. At the base of Punta del Diablo there are two conical elevations rising as islands out of the sea. These elevations when approached from the east appear perfectly symmetrical, the more distant from the point being capped by an eagle's high nest. The hills are green to their summits.

Near these conical islands we rowed into a grotto of wonderful beauty. It extends deep under the mountain and as our boat made its way in, we saw many seals and sea-lions on the ledges of the rock. As we rowed in, these huge animals dove into the sea with hoarse barking and swam into the depths of the cave. We fired at them with our rifles and the reverberation was something deafening. In the cave, which extended many feet beyond, a tremendous sea was rushing at every incoming wave. The whole grotto reminded me of the famous grotto of Capri in the Bay of Naples.

Beyond Punta del Diablo the cliffs take the form of a gigantic saw, the top of the precipices being worn out into valleys which are symmetrical one after another. Beneath these saw-like valleys the rock shows much erosion especially near the level of the sea. At one place a perfectly formed human figure which appears to be in the act of stepping into the sea, can be made out. A tremendous surf breaks on the base of the cliffs and here and there where there are partially submarine grottos or caves the escaping air throws the water to great heights with a loud noise.¹ Behind us the monster

¹These spouts of water thrown into the air by the resistance of the air compressed in a half submarine grotto by an incoming wave are among the most interesting

cliff of Punta del Diablo extends almost perpendicularly out of the water. The view of the coast looking both east and west is perfectly grand. Away to the west we sight the conical rocks and islands which form the eastern side of the "Seal Rookery."

As we row along we see here and there on the sides of the cañons a few sheep and one or two wild hogs. The east side of the Seal Rookery is bounded by islands with natural arches and lofty cliffs. Off these islands a short distance there is a small island with a flat top, and near it are two beautiful natural arches. The flat rock is white with guano, and the natural arches are high enough to allow a boat to pass under them. There is no landing place of any size at the Rookery, but vast numbers of seal are seen basking in the sun. Here we see much kelp, and for the most part the coast everywhere is bold and rugged. At the Seal Rookery we turn back towards Star Cañon and after a hard pull we came at last to the smooth water in which the schooner is at anchor.

One of the most beautiful of all the cañons which we passed was Lady's Cañon, a most picturesque place with smooth water and cliffs rising on all sides. The scenery here is very grand. Floating kelp was found at several places and one or two gigantic floats of the "Sea-Onion" were found, but as a general thing the coast is bare and no zone of kelp like that of Santa Barbara was seen.

phenomena of the coast. Their height is often very considerable and the noise with which the water is forced out is often very great. The surf upon the base of the cliffs is often very heavy after the sudden winds which often arise without a moment's warning.

The sudden and local character of the gusts of wind is in some cases due to the cañon configuration of the coast. A most marked instance illustrative of this explanation was experienced in my approach a few weeks later to the harbor of Port Harford the port of San Luis Obispo. We had steamed along the whole afternoon over a tranquil sea without a ripple when suddenly on our approach to this port there came down a violent gust of wind out of the cañon such that the steamer seemed to pass immediately into a raging tempest which as suddenly ceased when we drew up at the wharf.

(To be continued.)